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November 26, 2002

B-09075-0144-0110

REPA3-1010-009

Ms. Amberet Green  
Region 10 Project Officer  
U.S. Environmental Protection Agency  
1200 6<sup>th</sup> Avenue - WCM-122  
Seattle, WA 98101

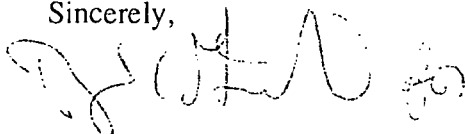
Subject: EPA Contract No. 68-W-02-022, Work Assignment R10210, Task 9,  
Preliminary Evaluation of the Adequacy of the Sediment Evaluation  
Component of the Eastern Michaud Flats Ecological Risk Assessment

Dear Ms. Green:

In response to Work Assignment R10210, Task 9 under EPA Contract 68-W-02-022, Booz Allen Hamilton Inc., is pleased to provide the Preliminary Evaluation of the Adequacy of the Sediment Evaluation Component of the Eastern Michaud Flats (EMF) Ecological Risk Assessment for the EMF Superfund Site located in Pocatello, Idaho.

If you have any questions or comments concerning this deliverable, please contact me at (206) 386-4791.

Sincerely,



Pat Shanley  
Regional Manager

BOOZ ALLEN HAMILTON INC.

Enclosures

cc: Linda Meyer, EPA Work Assignment Manager  
Mario Chaple, EPA Contracting Officer (cover letter only)  
BAH PMT



# **PRELIMINARY EVALUATION OF THE ADEQUACY OF THE SEDIMENT EVALUATION COMPONENT OF THE EASTERN MICHAUD FLATS ECOLOGICAL RISK ASSESSMENT**

**November 26, 2002**

## **1. Overview**

This document provides a brief synopsis of the sediment sampling and ecotoxicity assessment of Portneuf River and American Falls Reservoir that was performed in the Ecological Risk Assessment (ERA) for the Eastern Michaud Flats Superfund Site (EPA, 1995). The components of the sediment assessment included sampling and analysis of sediments (Section 2) and ecological risk screening and ERA conclusions (Section 3). Section 4 presents preliminary opinions and recommendations regarding the adequacy of the sediment evaluation component of the ERA, and Section 5 lists the information cited.

## **2. Sampling and Analysis of Sediments**

Sediment samples were collected and analyzed for selected contaminants during the Remedial Investigation/Feasibility Study (RI/FS) and the ERA. The additional sediments sampled in the ERA were collected because of the potential for higher concentrations and greater wildlife exposures in the depositional environments of the Portneuf River delta.

### **2.1 RI/FS Characterization**

The RI/FS sediment sampling and analysis was performed in the Portneuf River channel near the facilities (ERA, Appendix A). Aspects of the RI/FS sediment sampling and analysis included:

- Sample stations were located upstream of the Portneuf River delta.
- Forty-two analytes (in addition to pH and total organic carbon) were measured, including eight radionuclides. PCBs were the only organic compound analyzed.
- Ecological investigations were not performed (i.e., sediment toxicity, macroinvertebrate abundance/diversity, and bioaccumulation were not assessed).
- Multiple contaminants had a greater than 10 percent frequency of exceeding background concentrations, and either exceeded screening benchmarks or were not screened because toxicity screening values were not available. These chemicals included arsenic, beryllium, cadmium, calcium, chromium, copper, fluoride, phosphorus, selenium, silver, thallium, vanadium, lead-210, gross alpha, and uranium-238.

## **2.2 Ecological Assessment Characterization**

Additional sediment sampling and analysis was performed in the Portneuf River downstream of RI/FS stations, and was focused on a more limited set of analytes (ERA, Appendix B). Aspects of the ERA sediment sampling and analysis included:

- Ten stations were sampled, with the most upstream sample area located 0.5 km downstream from the furthest downstream RI/FS sample station.
- Samples were collected at approximately 1 km intervals from the most upstream ERA station (~0.5 km upstream of the Dougway Boat Ramp) to 10 km downstream in the Portneuf River delta. Upstream samples 9 and 10 were collected at a 0.5 km interval. Sample stations included locations in American Falls Reservoir.
- Each sample station included an open water river channel sample and a shallow water or exposed mud flat sample collected outside of the main stream channel.
- Eight analytes were measured: aluminum, arsenic, cadmium, fluoride, iron, mercury, selenium, zinc (+ total organic carbon and acid volatile sulfide).
- Simultaneously extracted metals/acid volatile sulfide (SEM/AVS) ratios were determined as an index of metal bioavailability.
- Sediment toxicity testing was performed at upstream riverine locations in the vicinity of the IWW ditch outfall.
- The planned Phase 2 sediment toxicity testing and bioaccumulation assessments were not performed because the ERA authors considered contamination in the Portneuf River delta sediment to be minimal. Benthic macroinvertebrate assessments (e.g., abundance/diversity) were also not performed.
- Many mercury samples were noted to be rejected in the ERA (Appendix B) because of quality assurance/quality control concerns.

## **3. Ecological Risk Screening and ERA Conclusions**

The ecological risk screening and conclusions presented in the ERA (EPA, 1995) included:

- Concentrations of chemicals in sediments downgradient of the facility were compared to concentrations in designated background areas (e.g., Snake River delta) and to available ecotoxicity benchmarks.
- Multiple chemicals had background exceedences, missing benchmarks, and toxicity threshold exceedences. PCB detection limits were elevated relative to low effects sediment screening benchmarks and levels protective of wildlife.

- Only cadmium was quantitatively evaluated in the ERA, and food chain risks from contaminated sediment were not assessed.

#### **4. Preliminary Opinions and Recommendations**

Preliminary opinions regarding the adequacy of the ERA sediment evaluation and recommended actions are provided below.

##### **4.1 Adequacy of the ERA Sediment Evaluation**

- The spatial extent of seven metals (aluminum, arsenic, cadmium, fluoride, iron, selenium, zinc) has been adequately characterized in the Portneuf River delta (ERA samples). Mercury was also measured in the delta, but data for multiple samples were rejected in the ERA.
- Maximum reported concentrations of these metals did not exceed probable effect concentrations (MacDonald et al., 2000). Concentrations of cadmium, mercury, selenium, and zinc in a few samples did exceed NOAA (1999) low-effects levels. Ecotoxicity benchmarks were not available for fluoride.
- Additional contaminants had a greater than 10 percent frequency of exceeding background concentrations but were only analyzed in upstream samples (RI/FS samples). The additional chemicals that either exceeded screening benchmarks or were not screened because benchmarks were not available for the ERA included beryllium, calcium, chromium, copper, phosphorus, silver, thallium, vanadium, lead-210, gross alpha, and uranium-238.
- Maximum reported concentrations of the RI/FS metals did not exceed probable effect concentrations (MacDonald et al., 2000). Concentrations of chromium, copper, silver, and vanadium in a few samples did exceed NOAA (1999) low-effects levels. No benchmarks were available for beryllium, calcium, phosphorus, and thallium.
- SEM/AVS ratios were greater than 1 for many samples indicating that metals were bioavailable.
- A preliminary risk screening was performed using previously unavailable toxicity benchmarks for radionuclides (Bechtel Jacobs Company, 1998). This screening indicated that the radionuclides exceeding background levels in upstream samples were two to three orders of magnitude below concentrations posing risks to fish. Risks of radionuclides in downstream samples are unknown.
- PCB detection limits were elevated relative to low-effects sediment screening benchmarks and levels protective of wildlife.

- The ERA was not performed according to current EPA guidance (EPA, 1997; 2001), which was not available at the time of the assessment. Additional contaminants of concern would likely have been identified following current guidance.

## 4.2 Recommendations

The following steps are recommended to determine whether sediment contamination is of concern in the Portneuf River delta and American Falls Reservoir:

- (1) The potential ecological risks of sediment contaminants should be first re-assessed prior to determining the need for additional sampling and analysis. The re-assessment would use existing data and include:
  - Comparing contaminant levels in more upstream (RI/FS locations) areas to river delta areas (ERA locations) to determine if there is a pattern of higher concentrations in the delta. This would address the question whether the contaminants measured in the RI/FS, but which were excluded in the ERA, have the potential to be elevated in the delta.
  - Evaluating the potential for wildlife risks by estimating bioaccumulation and comparing estimated tissue levels to wildlife toxicity thresholds. This would focus on those sediment contaminants considered to be potentially bioaccumulative.
  - Reporting the re-assessment in a brief summary, rather than a formal ecological risk assessment.
- (2) Additional sediment sampling should be considered if the re-assessment indicates the potential for ecological risks. Sampling would be performed at selected locations with elevated levels of contaminants (e.g., ERA sample stations 2, 3, 4, and 5). Sampling and analysis would be directed at addressing data gaps and uncertainties of those chemicals identified to exceed background concentrations. Analytes would include mercury (high frequency of rejected ERA samples), selected radionuclides (no data at downstream stations), fluoride, arsenic, chromium, copper, phosphorus, silver, thallium and vanadium. The existing spatial extent of sampling (EPA, 1995) is considered to be adequate, so any additional sampling would be focused on measuring additional contaminants rather than evaluating additional locations.
- (3) Sediment toxicity testing should be conducted concurrently at locations with additional sediment sampling. This is recommended because some sediment contaminants do not have available ecotoxicity screening values (e.g., fluoride) to allow an assessment of potential risks. The sediment bioassays would be used as part of the weight of evidence evaluation if Step 1 above determines there risks may exist in the delta and reservoir.

## 5. Information Cited

Bechtel Jacobs Company. 1998. *Radiological Benchmarks for Screening Contaminants of Potential Concern for Effects on Aquatic Biota at Oak Ridge National Laboratory, Oak Ridge, Tennessee*. BJC/OR-80. US Department of Energy.

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MacDonald D. D., Ingersoll, C. G., and Berger, T. 2000. *Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystems*. Arch. Environ. Contam. Toxicol. 39:20-31.

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